

ORIGINAL ARTICLE

The Pattern of Hair Dyeing in Koreans with Gray Hair

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Background: Hair graying is considered as a part of normal ageing process. Nonetheless, this process raises a significant cosmetic concern, especially among ethnic Korean elderly whose baseline hair color is black. For this reason, Korean elderly dye their hair with frequency despite the risk of dermatologic problems such as allergic contact dermatitis.

Objective: In this study, the authors investigate the prevalence and pattern of hair dyeing and its relation with scalp diseases in Korea. **Methods:** Six hundred twenty subjects (330 men and 290 women) with graying hair were given a questionnaire survey and underwent a physical examination. **Results:** Of the 620 total, 272 subjects (43.9%) dyed their hair. Hair dyeing was significantly more frequent among women than among men ($p < 0.001$). Subjects from 50 to 69 years of age showed higher prevalence of hair dyeing when compared to either younger or older groups. Subjective self-assessment of the extent of hair graying was associated with increased prevalence of hair dyeing, that is, individuals who feel graying has advanced by more than 20% of the overall hair were much more likely to dye their hair ($p < 0.001$). Hair dyeing did not correlate with either alopecia or scalp disease. **Conclusion:** Our survey has found that the prevalence of hair dyeing is higher among Korean women than men. People in their fifties and sixties and people with more than 20% extent of grayness were more likely to dye their hair than otherwise. Hair dyeing was not

associated with any increase in the prevalence of scalp diseases. (*Ann Dermatol* 25(4) 401~404, 2013)

-Keywords-

Hair color, Hair dyes

INTRODUCTION

Hair graying is a natural part of the aging processes¹ and occurs in about 50% of the people after the age of 50 years²⁻⁴. However, premature hair graying is associated with pernicious anemia, osteopenia, thyroid disease, and several rare syndromes, such as progeria and Werner's syndrome⁵⁻⁹. However, most of people who develop gray hair are healthy and experience the usual life span of a given population.

Though gray hair itself is not a medical problem, it is a significant cosmetic concern. When adjusted for other variables, people with gray hair look older for their age¹⁰, and a portion of this population does dye the gray hair for aesthetic purposes. Therefore, behaviors surrounding hair dyeing reflect a desire for beauty and youth, and these behaviors are different across individuals according to their gender, age, race, the proportion of gray hair, etc. However, large epidemiologic study on hair dyeing has not been performed to-date.

In this study, we investigate the prevalence of hair dyeing in Korean subjects with gray hair.

MATERIALS AND METHODS

Study population

Upon study approval by the institutional review board (IRB No. H-0912-059-304), gray-haired subjects, without a pigment disorder or a hair disease other than patterned hair loss, were recruited at outpatient dermatology clinics

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at Seoul National University Hospital and at the Boramae Medical Center (Seoul, Korea). After informed consent, each subject was given a questionnaire and underwent physical exam.

Details of questionnaires and the physical examination

The extent of grayness was self-reported as follows: grade 1 (gray hair less than 20%), grade 2 (20% to 40%), grade 3 (40% to 60%), grade 4 (60% to 80%), and grade 5 (more than 80% gray hair). Data regarding demographic information (age and gender), hair dyeing and scalp skin diseases was also collected. The presence of scalp-related diseases were evaluated by physicians.

Statistical analysis

The chi-square test for nominal variables and the Student’s

t-test for continuous variables were used to determine the significances of differences. Analyses were performed using SPSS version 17.0 (SPSS Inc., Chicago, IL, USA), and *p*-values of <0.05 were considered significant.

RESULTS

Demographic characteristics

Six hundred twenty subjects (330 men and 290 women) with gray hair were enrolled. All subjects were ethnic Koreans. The mean age was 50.8 years (± 14.8), with a range from 15 to 91 years. The age distribution of gray hair between men and women were not significantly different ($p > 0.05$). The mean of grayness grade from the survey was 2.1 (± 1.3), and there were no significant differences between the grade reported by men and

Table 1. The number of subjects in each age group according to the extent of gray hair

Age group (yr)	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total
10~19	9	1	0	0	0	10
20~29	40	5	1	0	0	46
30~39	78	11	1	2	0	92
40~49	80	21	14	3	1	119
50~59	66	53	23	21	11	174
60~69	21	28	26	22	18	115
70~79	8	8	11	16	8	51
Over 79	2	0	1	3	7	13
Overall	304	127	77	67	45	620

Values are presented as number. Grade 1: gray hair less than 20% among total hair, grade 2: 20%~40%, grade 3: 40%~60%, grade 4: 60%~80%, grade 5: more than 80%.

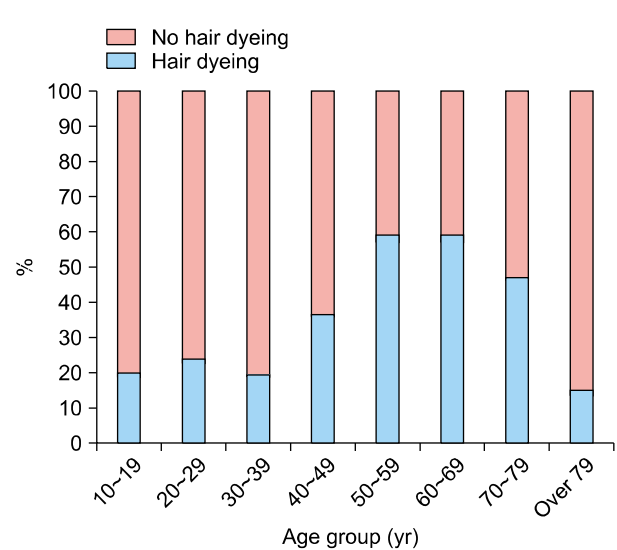


Fig. 1. Proportions of subjects with dyed hair by age in each age group.

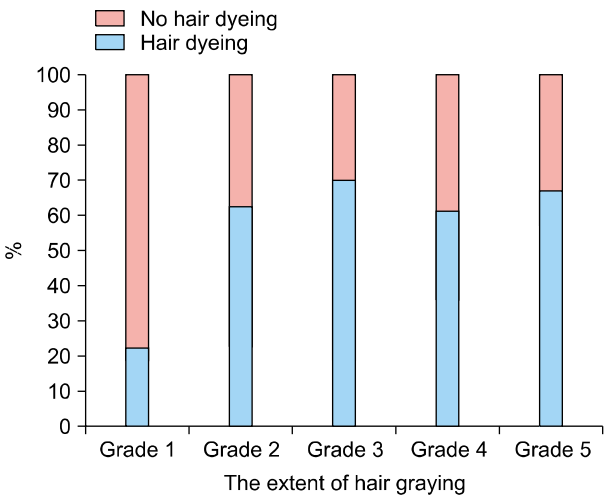


Fig. 2. Proportions of subjects with dyed hair according to the extent of grayness. Grade 1: gray hair less than 20% among total hair, grade 2: 20%~40%, grade 3: 40%~60%, grade 4: 60%~80%, grade 5: more than 80%.

Table 2. The prevalence of hair dyeing in the non-hair loss group and the hair loss group

Prevalence of hair dyeing	Group (n)		Total
	Non-hair loss	Hair loss	
No hair dyeing	272	76	348
Hair dyeing	212	60	272
Overall	484	136	620

reported by women ($p > 0.05$). Most subjects under 50 years of age had a grayness grade of 1 (Table 1).

Prevalence of hair dyeing in the subgroups

Of the 620 gray haired subjected total, 272 (43.9%) dyed their hair on regular basis. Dyeing behavior was significantly different across gender ($p < 0.001$). In this study, lesser proportion of men (33.9%) dyed their hair than women, the latter among whom 55.2% of subjected dyed their hair regularly. Analysis by age revealed that only about 20% of subjects in their twenties or thirties dyed their hair to mask the gray hair, but this trend increased sharply to 60% among subjects of 50 to 69 years of age then decreased to $< 20\%$ for those aged over 80 (Fig. 1). Dyeing behavior seemed to be associated with individual subjective judgments of the extent of graying (Fig. 2). The prevalence of hair dyeing was only 22.4% among subjects who considered the gray hair to be less than 20% of the total amount (grade 1), but the prevalence exceeded 60% among subjects who thought more than 20% of their hair was turning gray (over grade 2). This difference was significant ($p < 0.001$).

The prevalence of hair dyeing was not significantly different between the non-hair loss group and the patterned hair loss group, that is, 43.8% dyed hair in the non-hair loss group and 44.1% in the hair loss group ($p > 0.05$; Table 2).

Relation between hair dyeing and scalp diseases

At the time of survey, each study subject was evaluated for the presence of scalp discomforts, such as an itching sensation, pain, or increased scale, and was interviewed regarding any previously diagnosed skin disease of the scalp. Based on the presence of scalp disease, subjects were then classified into two, non-scalp disease and scalp disease, groups. The prevalence of hair dyeing was not significantly different in these two groups ($p > 0.05$), that is, 45.6% of those in the non-scalp disease group and 37.7% in the scalp disease group dyed their hair (Table 3).

Table 3. The prevalence of hair dyeing in the non-scalp disease group and the scalp disease group

Prevalence of hair dyeing	Group (n)		Total
	Non-scalp disease	Scalp disease	
No hair dyeing	262	86	348
Hair dyeing	220	52	272
Overall	482	138	620

DISCUSSION

The incidence of graying is known to be similar for men and women², and our survey confirms that this to be true among the Korean population. However, hair dyeing prevalence was found to be highly dependent on gender, suggesting that women are more concerned about graying than men in Korea. This interpretation can be used to explain differences in hair dyeing behaviors among subjects with different grades of graying. Individuals who feel graying has advanced to more than 20% of the total hair were more likely to be concerned about graying, and thus, were more likely to dye their hair.

Our survey revealed that hair dyeing is more common for people over the age of 40 years than among people in twenties or thirties. We believe this is also reflects different levels of concern regarding hair graying among different age groups. In Korea, the onset of graying normally occurs in the third or fourth decade of life¹¹. A previous report published in Korea did reveal that 62.7% of 1,499 university freshmen had their hair dyed at least once in their life¹², but this prevalence figure was determined without the purpose of hair dyeing in study design, whereas the current study was limited to hair dyeing specifically for masking of gray hair, which would explain why our results indicate a much lower hair-dyeing prevalence among the younger population.

Furthermore, we have found that the proportion of people who dye their hair decreased to less than 20% after the seventh decades of life, which indicates that subjects over 80 usually do not mind the gray hair as gray hair is considered socially acceptable for this age group in Korea. In addition, we have found that the prevalence of hair dyeing is not dependent on hair loss, which indicates that hair dyeing behavior is not affected by existing hair loss. In fact, hair loss was reported not to be significantly correlated with graying¹¹.

Few studies have suggested that the components of hair dye can cause allergic contact dermatitis of the scalp^{13,14}. However, we did not observe any increase in the prevalence of scalp disease, including contact dermatitis,

amongst those subjects who dyed their hair (Table 3). Thus, hair dyeing did not significantly correlate with the presence of a scalp disease (odds ratio=0.72). p-Phenylenediamine is a component of hair dye and a well known allergic contact sensitizer¹⁵, but recent hair dyes have been developed without sensitizing agents like p-phenylenediamine, ammonia, paraben, mineral oil, or benzo-phenone. Many patients who are sensitized to p-phenylenediamine have undoubtedly benefitted from these alternative hair dyes¹⁶, and this may explain why hair dyeing was not found to be associated with an increase in the prevalence of scalp disease or contact dermatitis among the subjects enrolled in this study.

Hair dyeing is performed as a routine part of everyday life for a large proportion of the aging population, but few studies have been conducted on its prevalence. In the current study, we found that Korean women, people in their fifties and sixties, and people with more than 20% extent of grayness were more likely to dye their hair than otherwise. We believe that these findings would be helpful to clinicians, researchers in pharmaceutical field, and the general public.

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